

GaAS MMIC SP4T SWITCH DC TO 2.0 GHz

FEBRUARY 2001

v01.0101

Features

LOW INSERTION LOSS: 0.4dB

INTEGRATED 2:4 DECODER

14 LEAD SOIC PACKAGE



General Description

The HMC165S14 is a low-cost SP4T switch in a 14-lead SOIC package for use in antenna diversity, switched filter banks, gain/attenuation selection, and general channel multiplexing applications. The switch can control signals up to 2.5 GHz and is especially suited for 800-1000 MHz basestation applications*. A 2:4 decoder is integrated on the switch, requiring only 2 control lines and a negative bias to select each RF path. Switch outputs are reflective shorts when "Off". The 2:4 decoder replaces 4 to 8 control lines normally required by GaAS SP4T switches. See positive bias/TTL SP4T HMC241QS16.

Guaranteed Performance

For 0/-5V Control and Vee = -5V in a 50 Ohm System, -40 to +85 deg C

| Parameter | Frequency | Min. | Typ. | Max. | Units |
|---|--------------|------|------|------|-------|
| Insertion Loss | DC - 0.5GHz | | 0.3 | 0.6 | dB |
| | DC - 1.0GHz | | 0.5 | 0.8 | dB |
| | DC - 2.0GHz | | 1.0 | 1.3 | dB |
| Isolation | DC - 0.5GHz | 35 | 39 | | dB |
| | DC - 1.0GHz | 28 | 32 | | dB |
| | DC - 2.0GHz | 20 | 24 | | dB |
| Return Loss | DC - 1.0GHz | 16 | 20 | | dB |
| | DC - 2.0GHz | 8.5 | 11 | | dB |
| Input Power for 1dB Compression | 50 MHz | | 22 | | dBm |
| | 0.5 - 2.0GHz | | 24 | | |
| Input Third Order Intercept | 50 MHz | | 35 | | dBm |
| | 0.5 - 2.0GHz | | 42 | | |
| Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF) | DC - 2.0GHz | | 25 | | ns |
| | | | 50 | | ns |

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SWITCHES

SP4T

SMT

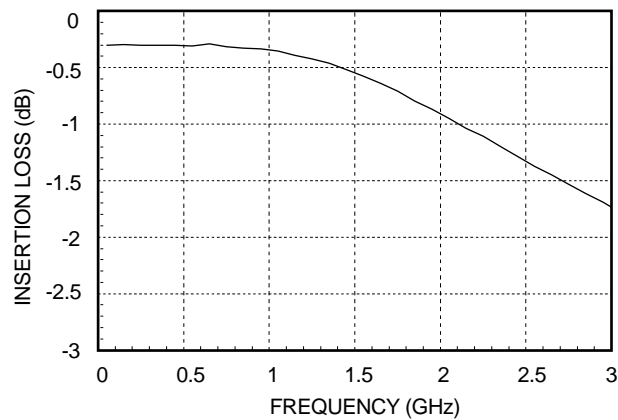


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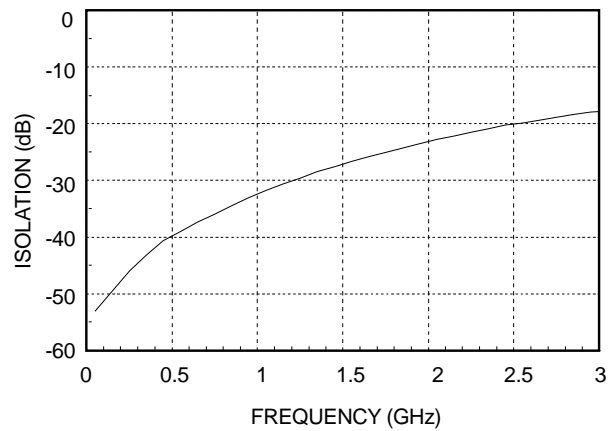
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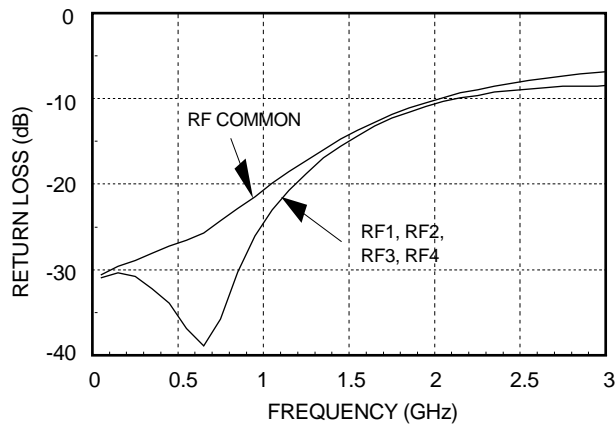
Insertion Loss



Isolation



Return Loss

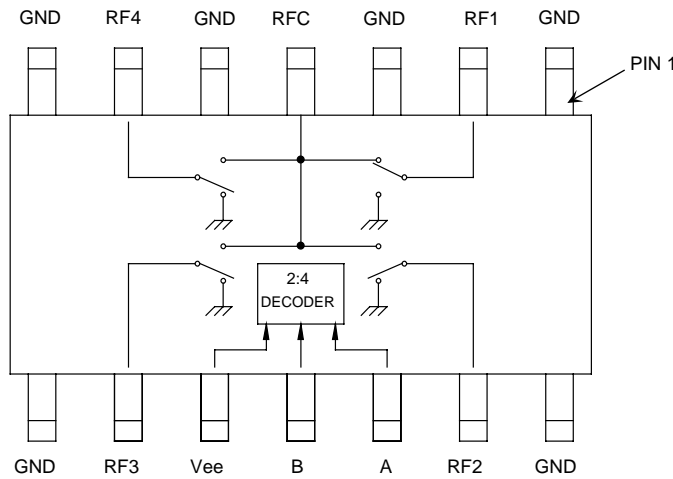


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Functional Diagram



Absolute Maximum Ratings

| | |
|-------------------------------|--------------------------------------|
| Bias Voltage Range (Port Vee) | -7.0 Vdc |
| Control Voltage Range (A & B) | Vee -0.5V to +1.0 Vdc |
| Storage Temperature | -65 to +150 deg C |
| Operating Temperature | -40 to +85 deg C |
| Maximum Input Power | +27dBm (<500MHz) +30dBm (>500MHz) |

Truth Table

| Control Input | | Signal Path State |
|---------------|------|-------------------|
| A | B | RFCOM to: |
| High | High | RF1 |
| Low | High | RF2 |
| High | Low | RF3 |
| Low | Low | RF4 |

Bias Voltage & Current

| Vee Range = -5.0 Vdc ± 10% | | |
|----------------------------|-----------------|-----------------|
| Vee (Vdc) | Iee (Typ.) (mA) | Iee (Max.) (mA) |
| -5.0 | 3.0 | 6.0 |

Control Voltages

| State | Bias Condition |
|-------|---------------------------|
| Low | 0 to -3 VDC @ 220uA Typ. |
| High | Vee +0.8 VDC @ 100uA Max. |

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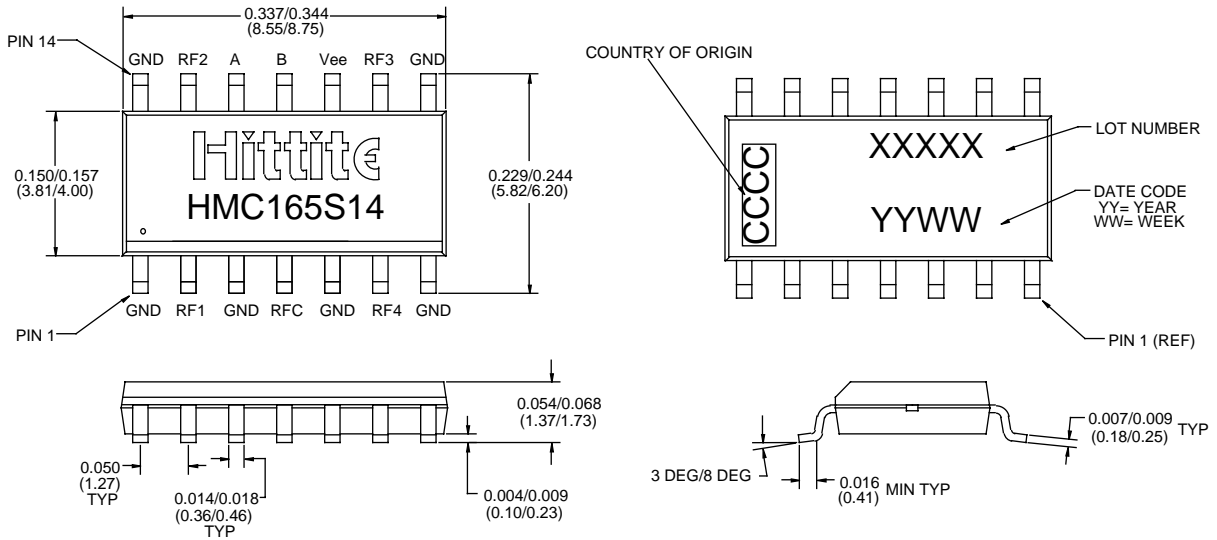


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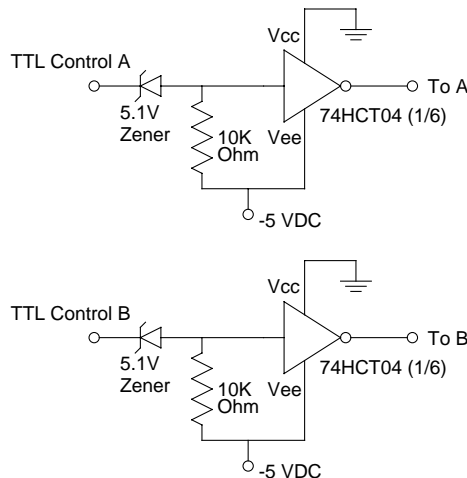
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Outline



- 1) MATERIAL:
 - A) PACKAGE BODY LOW STRESS INJECTION MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED
 - B) LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD-TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS) UNLESS OTHERWISE SPECIFIED TOL. ARE $\pm 0.005 (\pm 0.13)$

TTL Interface Circuit



Note:
Control inputs A and B can be driven directly with TTL logic with -5 Volts applied to the HCT logic gates (Vee) and to Vee (pin 10) of the RF switch.